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The Pursuit of Fakery

In the war between forgers and document analysts, both sides are pushing for the technological high ground
by Ellen Ruppel Shell



Forgeries, like the previously unpublished excerpt from a Hitler diary at left, keep document analysts like David Crown (above) in business.

Last spring it took historians, political scientists, and journalists weeks to conclude that the Hitler diaries were fakes. It took David Crown about 30 seconds.

"There was a scam like this fifteen years ago," chuckles the 54-year-old scientist. "Two little old ladies forged Mussolini's diaries and sold them to the Sunday London *Times* for a fabulous sum. It's amazing what people will believe when they really want to."

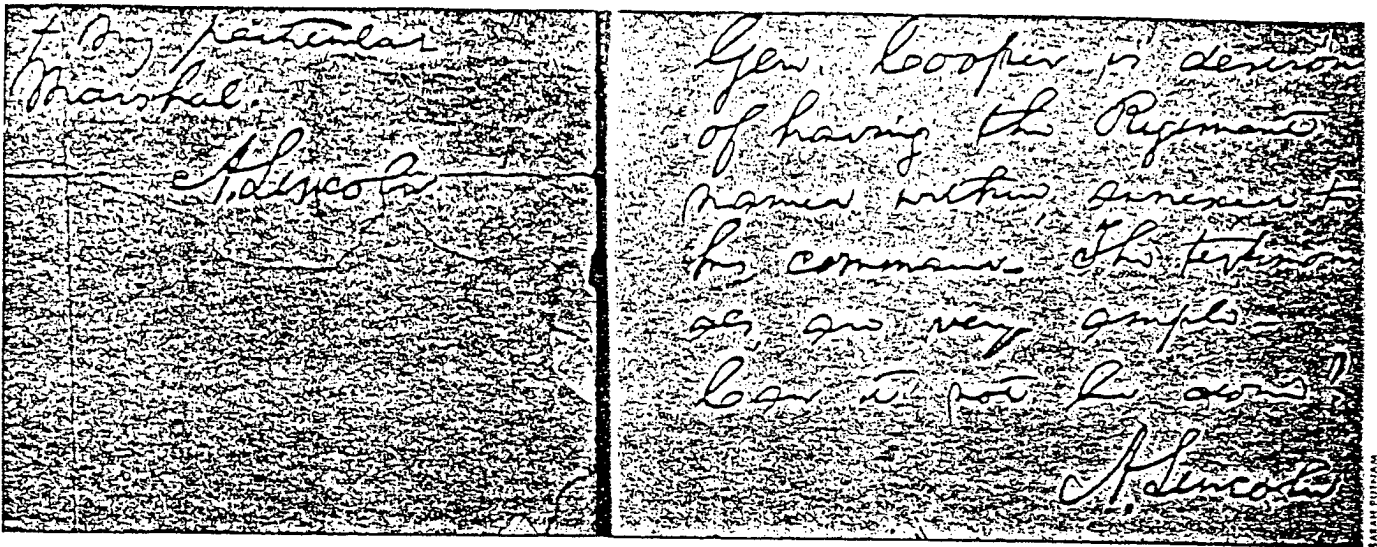
Crown's flippancy is hard-earned. As chief of the Central Intelligence Agency's questioned-document laboratory for 15 years, he saw hundreds of forgeries—many of which fell to him to discredit. Like other document analysts with years of experience, his close scrutiny of a suspect signature was often sufficient to

wind up an investigation. But while handwriting analysis has always played a major role in such cases, particularly when there's a sample available for comparison, it is by no means the only trick up the document analyst's sleeve. Technological developments over the last 30 years have made identifying documents as much of a science as an art, complete with its own professional journals, academic specialties, and arsenal of elaborate analytic devices.

The Hitler diary investigation illustrates just how far the field has come since the days of magnifying glasses and fingerprint powder. While writing experts examined samples of script from the leatherette-bound texts, chemists at the West German Federal Criminal Office put parts of three of the volumes

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Abraham Lincoln never even saw, let alone signed, the document on the top left, as a comparison with the real Lincoln letter on the right quickly indicates. Kenneth Rendell (above), a world expert in historical documents, uses a stereoscopic microscope to cull the real from the fabricated.

through a battery of tests that included a complete breakdown of paper, ink, and binding material. The first hint of deception was the paper's whiteness under ultraviolet light, a glow typical of optical brighteners used in paper and clothing since the mid 1950s. The diaries were dated 1934, 1941, and 1943. Chemical separation techniques verifying the presence of the brighteners immediately cast doubt on the diaries' authenticity. But the German team went further, analyzing the glue in the books' bindings with infrared spectroscopy. The spectrograph showed traces of an adhesive component and synthetic fibers that were also not in use until after World War II. Finally, a third chemical test showed that two of the three diaries sampled were written in ink that was no more than two years old.

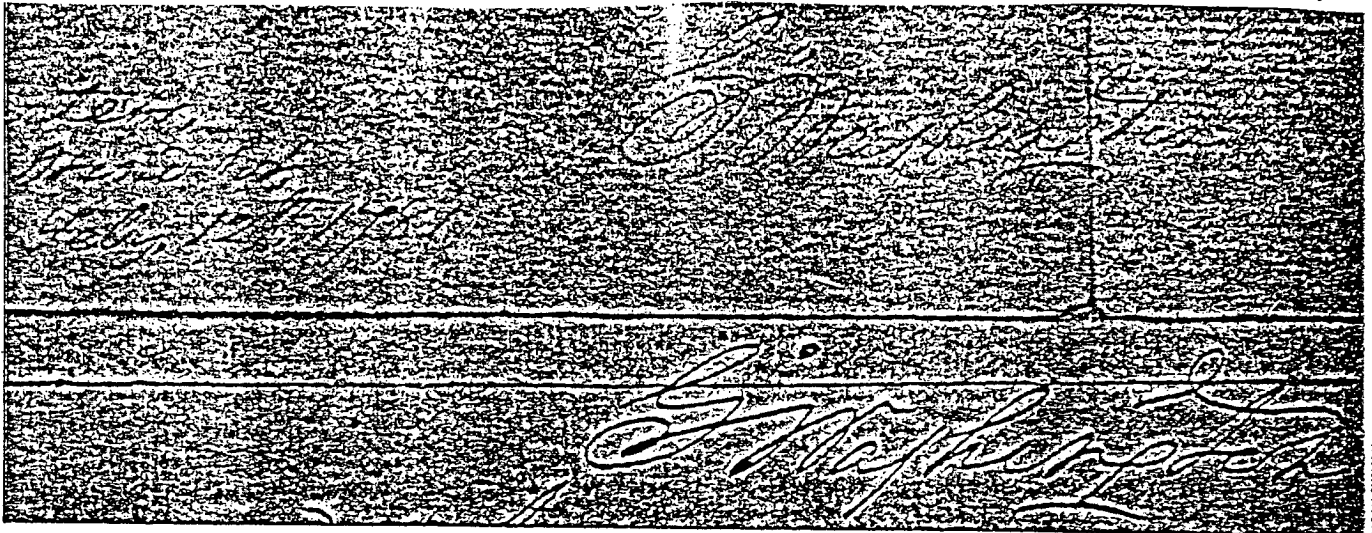
"The job the forger did on the Hitler diaries was very, very bad," says Arno Falk, press officer at the German criminal office. It was so bad that scientists were convinced it was phony after running just a fraction of the available tests. But Kenneth Rendell, a Boston-area dealer in historical papers and the only American to examine the Hitler diaries, explains that most forgeries are so poorly executed that a simple eyeballing of the item is often enough to close a case.

"A lot of forgers overlook the importance of paper and use types that either were not in use or were not even invented at the time of the purported document," explains the 40-year-old handwriting expert. Paper made of wood pulp, the kind this page is printed on, wasn't invented

until 1861, so a letter from George Washington written on pulp paper is a sure fake. So is a note by Shakespeare written on woven paper, which came into use between 1750 and 1800. Romeo and Juliet were probably immortalized on laid paper, a kind of rag paper formed on a wire frame, while a document written before 1400 should be composed of parchment or vellum made of animal skins. Paper manufacturers' watermarks can give even more specific information. Often they contain codes, for which document examiners have keys, that indicate the exact date of manufacture. Many a will has been thrown out of court for being written on paper with a watermark that postdated the testator's death.

But according to Gary Herbertson, unit chief of the document section of the Federal Bureau of Investigation, mere dating is not always enough. "Getting old paper is easy for a bad guy," he explains. If the dates are OK or irrelevant to the investigation and more clues to the paper's origin are needed, a sample of the suspect document is boiled in an acid bath, and the resulting slurry is mounted on a slide, stained, and examined under an optical microscope. Skilled examiners can determine whether the pulping process was mechanized or chemical and, if the latter, what kind of chemicals were used. Using X-ray defraction, they can also determine what fillings and fibers were used, even what kind of tree the pulp came from. Such information sometimes leads to the manufacturing plant itself; at least it may give investigators an

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The fake George Washington letter (top above) is easily distinguished from the authentic sample beneath. But sometimes a mere eyeballing of handwriting is not enough. That's when ink specialist Joanne Becker (above) comes into the picture. If the ink is too new, the document is not genuine.

idea of what country or state the paper was made in. For example, most paper made in the United States is of white pine, so a sample that shows the woody vessels of hardwood trees might lead to a search for foreign sources.

Unfortunately for forensic scientists, however, the paper industry changes very slowly. A single process may be used by hundreds of manufacturers for decades, thereby making paper difficult and sometimes impossible to trace. The ink business is probably more mercurial, Herbertson suggests, because getting ink to flow smoothly from a ball-point pen is an ongoing challenge. So investigators often look to ink for more specific clues.

The Federal Treasury Department has the world's largest collection of ink samples—over 4,000 varieties submitted voluntarily by ink makers the world over. The ink library was established in 1968, initially to help the Internal Revenue Service track down checks backdated by tax evaders. Ink analysis at the Treasury Department's Alcohol, Tobacco, and Firearms laboratory entails lifting a sample from the suspect document (with a hypodermic needle if the document is valuable, or simply dissolved off the paper if it's not) and putting it through thin layer chromatography to separate it into its component dyes. These dyes are then compared by hand for color and concentration with those in the ink collection to determine when the ink formula was first used and how rare or common it is. Naturally, a library sample that matches perfectly with that

in the ubiquitous Bic finepoint won't be of much help in tracking down an unknown perpetrator, but it may help establish backdating fraud if the formula was not in existence at the alleged date of the document. Antonio A. Cantu, former head of the Treasury Department's ink-and-paper analysis section, now working for the FBI, says that the physical decay of the ink can sometimes be as incriminating as its type. The longer the ink has been on the paper, Cantu says, the drier it should be. New ink is, up to a point, easier to remove with solvents than old. Also, naturally occurring electrically charged atoms, or ions, of ink migrate across paper with time, leaving a trail that, to an expert examiner, can be as easy to read as a clock dial.

"Even if the Hitler diaries had been written on old paper with old ink, the relatively small amount of ion migration would have revealed them as fakes," Cantu says. Ion migration can help date documents up to 10 years old, and a difference in the relative movement of the ions on a single document is a giveaway that an original has been tampered with.

Under Cantu's prodding, many manufacturers now tag inks with minute amounts of rare earth elements to help in their tracing. Still, even if an ink sample matches that on, say, a ransom note or a phony check, it can only implicate, not incriminate, a suspect.

"This kind of evidence doesn't carry much weight," says Cantu. "It is more useful for eliminating incorrect possibilities than for identifying correct ones."

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Phony documents attributed to Charles Dickens and Robert Frost (on the left in each top photo) come close enough to the real ones (on the right) to fool some hapless buyers. Unfortunately, the threatening letters filed by the thousands in the FBI collection (above) are all too real.

Catching criminals red-handed usually requires as much fortunate coincidence as technological savvy. Paul Osborn, a third-generation document analyst who helped expose Clifford Irving in the Howard Hughes "autobiography" hoax 11 years ago, has enjoyed his share of such lucky breaks. One of the most vivid occurred a few years back when Osborn was hired by a brokerage firm to track down the writer of hundreds of poison-pen letters being sent to the president of the New York Stock Exchange. Figuring the notes had to come from an irate employee, Osborn went through thousands of job applications in search of a signature that would match the writing on the hate mail. After perusing four years' worth of résumés without success, he decided to check some of the threatening letters for indentations—marks on paper made from the pressure of a writing instrument on sheets from above on the same pad. It was a tedious task. Each letter had to be hand-held under special spotlights and scrutinized for faint markings. But the effort finally paid off. Imprinted across one of the missives was the name, address, and phone number of the writer, an emotionally unbalanced employee who had left the firm almost five years before.

"There's a new device called ESDA, for electrostatic detection apparatus, that is great for picking up indentations," Osborn says. "It can detect even very slight indentations on paper seven or eight sheets down from the sheet being written on. If we'd had it when we went

through those stockbroker's letters, we could have finished the job in a fraction of the time."

Still, whether technology will ultimately make the document analyst's lot easier remains an open question. Criminals also keep abreast of scientific advances, and a forger's clever application of technology can baffle even the most astute criminologists.

Take a machine as seemingly benign as the photocopier. By carefully affixing a signature from another source, say a thank-you note, to a document, say a promissory note for a million dollars, photocopying the resulting montage, and "losing" the original, a forger can create an unimpeachable document.

"Copying machines have created the most dangerous pitfall in the business today," laments Osborn. "Courts have become very lax about allowing reproductions as evidence, and sometimes the copies are just impossible to authenticate."

Perhaps the biggest challenge today's technology poses to the analyst, however, is in the identification of computer-generated documents. Experts all over the country are collaborating in a massive effort to identify computer-printer makes and models by their printout.

"It's only a matter of time before computer-printer-generated documents will come into question," Osborn says. "And when they do, we'll be prepared."

Ellen Shell is a senior editor at TECHNOLOGY ILLUSTRATED.

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5.

He gives his hairier belly a shake
To ask if there is some mistake.
The only other sound, the sweep
Of easy wind and downy flake.
The woods are lovely, dark and deep,
But I have promises to keep,
And miles to go before I sleep—
And miles to go before I sleep.

Robert Frost

from here till eleven twenty
Eastern Time. Sorry. Don't
wait up for me. I shall get
home. See you in the
the morning.

Robert Frost

David Crown: Sleuth and Diplomat

Although he declines to give details of his CIA days (and the CIA will not confirm that his department even existed), David Crown admits to having convinced dozens of world leaders that a threat, warning, or misleading letter, supposedly instigated by the United States, was the work of an imposter. For example, in 1978 photocopies of a bogus U.S. Embassy press release were mailed anonymously to newspaper and news-service correspondents in Paris. In it Vice President Walter Mondale was quoted as having questioned the competence of both Prime Minister Menachem Begin of Israel and President Anwar Sadat of Egypt. The release was just one in a series of forgeries aimed at undermining American relations in the Middle East. David Crown's job, in this case and others, was to fly immediately to the offended nation and prove scientifically that the documents were fake.

Retired from the CIA last year, Crown is now in private practice as one of North America's approximately 225 certified document analysts. It is an arcane and lonely profession, requiring patience, intuition, honed scientific skills, and an almost voyeuristic curiosity. But the prospect of solving criminal puzzles,

of putting the finger on an expert forger or other malefactor, excites Crown the way danger tantalizes a skyjumper.

Plump, loquacious, his comments laced with sarcasm, Crown has no mark of the diplomat, yet the walls of the two-room office in his Fairfax, Virginia, home are covered with photos of Jimmy Carter, Hosni Mubarak of Egypt, former Emperor Bokassa I of the Central African Empire, and others for whom his personally delivered reports have offered consolation. Other souvenirs—a magnificent array of African and Asian weapons and a collection of antique phones, including a 1920 Egyptian model—crowd the space between scientific instruments and file cabinets. The equipment includes cameras, infrared and ultraviolet lights, several microscopes and spectrophotometers, test tubes, chemicals, a business computer, and a variety of rather mysterious-looking devices tailored specifically to his trade. The cabinets are crammed with documents from the dozens of cases Crown has cracked in a mere year of independent sleuthing.

Most of the papers come from attorneys who are hopeful that Crown will help prove medical malpractice or a client's right to insurance money or inheri-



David Crown in his Virginia office

tance. On his desk, for instance, is a will supposedly signed by a woman just before she died, leaving some valuable land to her niece. The signature is shaky—ostensibly the last effort of a failing hand. But Crown knows otherwise. Comparing the tremulous scrawl with known samples of the dead woman's writing, Crown dismisses the will as a fake. "You can see by the checks she signed that the poor thing was a solid writer once she got her pen to paper," he says. "It was finding the dotted line to begin with that gave her trouble. I'm afraid this attorney is going to be disappointed."